

The listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1.-14. (Canceled)

15. (Previously Presented) A method of fabricating a semiconductor device comprising:

adding an element for facilitating crystallization of an amorphous semiconductor thin film to a part or an entire region of the amorphous semiconductor thin film;

carrying out a first heat treatment to transform the part or the entire region of the amorphous semiconductor thin film into a crystalline semiconductor thin film;

irradiating a laser light to said crystalline semiconductor thin film; and

carrying out a second heat treatment for the crystalline semiconductor thin film at 900 to 1200 °C in a reducing atmosphere after the irradiation of said laser light,

wherein asperities of a surface of said crystalline semiconductor thin film are formed by said laser light, and said asperities are flattened by said second heat treatment.

16. (Original) A method according to claim 15, wherein the second heat treatment is carried out in the reducing atmosphere in which a concentration of oxygen or an oxide compound is not higher than 10 ppm.

17. (Previously Presented) A method of fabricating a semiconductor device comprising:

adding an element for facilitating crystallization of an amorphous semiconductor thin film to a part or an entire region of the amorphous semiconductor thin film;

carrying out a first heat treatment to transform the part or the entire region of the amorphous semiconductor thin film into a crystalline semiconductor thin film;

irradiating a laser light to said crystalline semiconductor thin film; and

carrying out a second heat treatment for the crystalline semiconductor thin film in a reducing atmosphere including a halogen element after the irradiation of said laser light, wherein asperities of a surface of said crystalline semiconductor thin film are formed by said laser light, and said asperities are flattened by said second heat treatment.

18. (Original) A method according to claim 17, wherein the second heat treatment is carried out at a temperature of 900 to 1200 °C.

21 19. (Original) A method according to claim 17, wherein the second heat treatment is carried out in the reducing atmosphere in which a concentration of oxygen or an oxide compound is not higher than 10 ppm.

20. (Previously Presented) A method of fabricating a semiconductor device comprising:

adding an element for facilitating crystallization of an amorphous semiconductor thin film to a part or an entire region of the amorphous semiconductor thin film;

carrying out a first heat treatment to transform the part or the entire region of the amorphous semiconductor thin film into a crystalline semiconductor thin film;

carrying out a second heat treatment of irradiating the crystalline semiconductor thin film with ultraviolet light or infrared light; and

carrying out a third heat treatment for the crystalline semiconductor thin film at 900 to 1200 °C in a reducing atmosphere after the second heat treatment.

21. (Original) A method according to claim 20, wherein the third heat treatment is carried out in the reducing atmosphere in which a concentration of oxygen or an oxide compound is not higher than 10 ppm.

22. (Previously Presented) A method of fabricating a semiconductor device comprising:

adding an element for facilitating crystallization of an amorphous semiconductor thin film to a part or an entire region of the amorphous semiconductor thin film;

carrying out a first heat treatment to transform the part or the entire region of the amorphous semiconductor thin film into a crystalline semiconductor thin film;

carrying out a second heat treatment of irradiating the crystalline semiconductor thin film with ultraviolet light or infrared light; and

carrying out a third heat treatment for the crystalline semiconductor thin film in a reducing atmosphere including a halogen element after the second heat treatment.

23. (Original) A method according to claim 22, wherein the third heat treatment is carried out at a temperature of 900 to 1200 °C.

24. (Original) A method according to claim 22, wherein the third heat treatment is carried out in the reducing atmosphere in which a concentration of oxygen or an oxide compound is not higher than 10 ppm.

25.-27. (Canceled)

28. (Previously Presented) A method of fabricating a semiconductor device comprising:

adding an element for facilitating crystallization of an amorphous semiconductor thin film to at least a portion of the amorphous semiconductor thin film;

carrying out a first heat treatment to transform the at least a portion of the amorphous semiconductor thin film into a crystalline semiconductor thin film; and

irradiating a laser light to said crystalline semiconductor thin film; and

carrying out a second heat treatment for the crystalline semiconductor thin film at 900 to 1200 °C in an atmosphere containing hydrogen therein after the irradiation of said laser light,

wherein asperities of a surface of said crystalline semiconductor thin film are formed by said laser light, and said asperities are flattened by said second heat treatment.

29. (Canceled)

30. (Previously Presented) A method of fabricating a semiconductor device comprising: forming a semiconductor film comprising silicon over a substrate;

crystallizing said semiconductor film;

irradiating a laser light to the crystallized semiconductor film; and

subsequently heating the crystallized semiconductor film provided with an oxide formed over a surface thereof in an atmosphere which reduces said oxide formed over said surface,

wherein asperities of a surface of the crystallized semiconductor film are formed by said laser light, and said asperities are flattened by said heating.

31. (Previously Presented) A method of fabricating a semiconductor device comprising:

forming a semiconductor film comprising silicon over a substrate;

crystallizing said semiconductor film;

irradiating a laser light to the crystallized semiconductor film; and

subsequently heating the crystallized semiconductor film provided with an oxide formed over a surface thereof in an atmosphere which reduces said oxide formed over said surface,

wherein said atmosphere comprises hydrogen, and

wherein asperities of a surface of the crystallized semiconductor film are formed by said laser light, and said asperities are flattened by said heating.

32. (Previously Presented) A method of fabricating a semiconductor device comprising:

forming a semiconductor film comprising silicon over a substrate;

irradiating a laser light to said semiconductor film to crystallize said semiconductor film;

etching a surface of the crystallized semiconductor film after the irradiation of said laser light to remove an oxide therefrom;

heating the crystallized semiconductor film in a reducing atmosphere after said etching step to form a flattened surface of the crystallized semiconductor film.

33. (Previously Presented) A method of fabricating a semiconductor device comprising:

forming a semiconductor film comprising silicon over a substrate;

irradiating a laser light to said semiconductor film to crystallize said semiconductor film;

treating a surface of the crystallized semiconductor film with hydrofluoric acid after the irradiation of said laser light to remove an oxide therefrom;

heating the crystallized semiconductor film in a reducing atmosphere after said treating step to form a flattened surface of the crystallized semiconductor film.

34. (Previously Presented) A method of fabricating a semiconductor device comprising:

forming a semiconductor film comprising silicon over a substrate;

crystallizing said semiconductor film;

irradiating a laser light to the crystallized semiconductor film;

subsequently heating the crystallized semiconductor film provided with an oxide formed over a surface thereof at a temperature of 900 to 1200 °C in an atmosphere which reduces said oxide formed over said surface,

wherein asperities of a surface of the crystallized semiconductor film are formed by said laser light, and said asperities are flattened by said heating.

35. (Previously Presented) A method of fabricating a semiconductor device comprising:

forming a semiconductor film comprising silicon over a substrate;

crystallizing said semiconductor film;

irradiating a laser light to the crystallized semiconductor film;

subsequently heating the crystallized semiconductor film provided with an oxide formed over a surface thereof at a temperature of 900 to 1200 °C in an atmosphere which reduces said oxide formed over said surface,

wherein said atmosphere comprises hydrogen, and

wherein asperities of a surface of the crystallized semiconductor film are formed by said laser light, and said asperities are flattened by said heating.

36. (Previously Presented) A method according to claim 30 wherein said heating step is carried out by furnace annealing.

37. (Previously Presented) A method according to claim 31 wherein said heating step is carried out by furnace annealing.

38. (Previously Presented) A method according to claim 32 wherein said heating step is carried out by furnace annealing.

39. (Previously Presented) A method according to claim 33 wherein said heating step is carried out by furnace annealing.

40. (Previously Presented) A method according to claim 34 wherein said heating step is carried out by furnace annealing.

41. (Previously Presented) A method according to claim 35 wherein said heating step is carried out by furnace annealing.

42. (Previously Presented) A method according to claim 32 wherein said heating step is carried out while exposing said semiconductor film.

43. (Previously Presented) A method according to claim 33 wherein said heating step is carried out while exposing said semiconductor film.

44. (Previously Presented) A method according to claim 34 wherein said heating step is carried out while exposing said semiconductor film.

45. (Previously Presented) A method according to claim 35 wherein said heating step is carried out while exposing said semiconductor film.

46. (Previously Presented) A method according to claim 30 wherein said crystallizing step is carried out in inactive atmosphere.

47. (Previously Presented) A method according to claim 30 wherein said crystallizing step is carried out in an atmosphere containing hydrogen therein.

48. (Previously Presented) A method according to claim 30 wherein said crystallizing step is carried out in an atmosphere containing oxygen therein.

49. (Previously Presented) A method according to claim 30 wherein said crystallizing step is carried out by heat treatment.

50. (Previously Presented) A method according to claim 30 wherein said crystallizing step is carried out by irradiating an ultraviolet light to said semiconductor film.

51. (Previously Presented) A method according to claim 30 wherein said crystallizing step is carried out by irradiating an infrared light to said semiconductor film.

52. (Previously Presented) A method according to claim 30 wherein said crystallizing step is carried out by irradiating a laser light to said semiconductor film.

53. (Previously Presented) A method according to claim 31 wherein said crystallizing step is carried out in inactive atmosphere.

54. (Previously Presented) A method according to claim 31 wherein said crystallizing step is carried out in an atmosphere containing hydrogen therein.

55. (Previously Presented) A method according to claim 31 wherein said crystallizing step is carried out in an atmosphere containing oxygen therein.

56. (Previously Presented) A method according to claim 31 wherein said crystallizing step is carried out by heat treatment.

57. (Previously Presented) A method according to claim 31 wherein said crystallizing step is carried out by irradiating an ultraviolet light to said semiconductor film.

58. (Previously Presented) A method according to claim 31 wherein said crystallizing step is carried out by irradiating an infrared light to said semiconductor film.

59. (Previously Presented) A method according to claim 31 wherein said crystallizing step is carried out by irradiating a laser light to said semiconductor film.

60. (Previously Presented) A method according to claim 32 wherein said crystallizing step is carried out in inactive atmosphere.

61. (Previously Presented) A method according to claim 32 wherein said crystallizing step is carried out in an atmosphere containing hydrogen therein.

62. (Previously Presented) A method according to claim 32 wherein said crystallizing step is carried out in an atmosphere containing oxygen therein.

63. (Previously Presented) A method according to claim 32 wherein said crystallizing step is carried out by heat treatment.

64. (Previously Presented) A method according to claim 32 wherein said crystallizing step is carried out by irradiating an ultraviolet light to said semiconductor film.

65. (Previously Presented) A method according to claim 32 wherein said crystallizing step is carried out by irradiating an infrared light to said semiconductor film.

66. (Previously Presented) A method according to claim 32 wherein said crystallizing step is carried out by irradiating a laser light to said semiconductor film.

67. (Previously Presented) A method according to claim 33 wherein said crystallizing step is carried out in inactive atmosphere.

68. (Previously Presented) A method according to claim 33 wherein said crystallizing step is carried out in an atmosphere containing hydrogen therein.

69. (Previously Presented) A method according to claim 33 wherein said crystallizing step is carried out in an atmosphere containing oxygen therein.

70. (Previously Presented) A method according to claim 33 wherein said crystallizing step is carried out by heat treatment.

71. (Previously Presented) A method according to claim 33 wherein said crystallizing step is carried out by irradiating an ultraviolet light to said semiconductor film.

72. (Previously Presented) A method according to claim 33 wherein said crystallizing step is carried out by irradiating an infrared light to said semiconductor film.

73. (Previously Presented) A method according to claim 33 wherein said crystallizing step is carried out by irradiating a laser light to said semiconductor film.

74. (Previously Presented) A method according to claim 34 wherein said crystallizing step is carried out in inactive atmosphere.

75. (Previously Presented) A method according to claim 34 wherein said crystallizing step is carried out in an atmosphere containing hydrogen therein.

76. (Previously Presented) A method according to claim 34 wherein said crystallizing step is carried out in an atmosphere containing oxygen therein.

77. (Previously Presented) A method according to claim 34 wherein said crystallizing step is carried out by heat treatment.

78. (Previously Presented) A method according to claim 34 wherein said crystallizing step is carried out by irradiating an ultraviolet light to said semiconductor film.

79. (Previously Presented) A method according to claim 34 wherein said crystallizing step is carried out by irradiating an infrared light to said semiconductor film.

80. (Previously Presented) A method according to claim 34 wherein said crystallizing step is carried out by irradiating a laser light to said semiconductor film.

81. (Previously Presented) A method according to claim 35 wherein said crystallizing step is carried out in inactive atmosphere.

82. (Previously Presented) A method according to claim 35 wherein said crystallizing step is carried out in an atmosphere containing hydrogen therein.

83. (Previously Presented) A method according to claim 35 wherein said crystallizing step is carried out in an atmosphere containing oxygen therein.

84. (Previously Presented) A method according to claim 35 wherein said crystallizing step is carried out by heat treatment.

85. (Previously Presented) A method according to claim 35 wherein said crystallizing step is carried out by irradiating an ultraviolet light to said semiconductor film.

86. (Previously Presented) A method according to claim 35 wherein said crystallizing step is carried out by irradiating an infrared light to said semiconductor film.

87. (Previously Presented) A method according to claim 35 wherein said crystallizing step is carried out by irradiating a laser light to said semiconductor film.

88. (Previously Presented) A method according to claim 15 wherein said semiconductor device is a video camera.

89. (Previously Presented) A method according to claim 15 wherein said semiconductor device is a digital camera.

90. (Previously Presented) A method according to claim 15 wherein said semiconductor device is a projector.

91. (Previously Presented) A method according to claim 15 wherein said semiconductor device is a head mount display.

92. (Previously Presented) A method according to claim 15 wherein said semiconductor device is a car navigation system.

93. (Previously Presented) A method according to claim 15 wherein said semiconductor device is a personal computer.

94. (Previously Presented) A method according to claim 15 wherein said semiconductor device is a portable information terminal.

95. (Previously Presented) A method according to claim 17 wherein said semiconductor device is a video camera.

96. (Previously Presented) A method according to claim 17 wherein said semiconductor device is a digital camera.

97. (Previously Presented) A method according to claim 17 wherein said semiconductor device is a projector.

98. (Previously Presented) A method according to claim 17 wherein said semiconductor device is a head mount display.

99. (Previously Presented) A method according to claim 17 wherein said semiconductor device is a car navigation system.

100. (Previously Presented) A method according to claim 17 wherein said semiconductor device is a personal computer.

101. (Previously Presented) A method according to claim 17 wherein said semiconductor device is a portable information terminal.

102. (Previously Presented) A method according to claim 20 wherein said semiconductor device is a video camera.

103. (Previously Presented) A method according to claim 20 wherein said semiconductor device is a digital camera.

104. (Previously Presented) A method according to claim 20 wherein said semiconductor device is a projector.

105. (Previously Presented) A method according to claim 20 wherein said semiconductor device is a head mount display.

106. (Previously Presented) A method according to claim 20 wherein said semiconductor device is a car navigation system.

107. (Previously Presented) A method according to claim 20 wherein said semiconductor device is a personal computer.

108. (Previously Presented) A method according to claim 20 wherein said semiconductor device is a portable information terminal.

109. (Previously Presented) A method according to claim 22 wherein said semiconductor device is a video camera.

110. (Previously Presented) A method according to claim 22 wherein said semiconductor device is a digital camera.

111. (Previously Presented) A method according to claim 22 wherein said semiconductor device is a projector.

112. (Previously Presented) A method according to claim 22 wherein said semiconductor device is a head mount display.

113. (Previously Presented) A method according to claim 22 wherein said semiconductor device is a car navigation system.

114. (Previously Presented) A method according to claim 22 wherein said semiconductor device is a personal computer.

115. (Previously Presented) A method according to claim 22 wherein said semiconductor device is a portable information terminal.

116.-122. (Canceled)

123. (Previously Presented) A method according to claim 28 wherein said semiconductor device is a video camera.

124. (Previously Presented) A method according to claim 28 wherein said semiconductor device is a digital camera.

125. (Previously Presented) A method according to claim 28 wherein said semiconductor device is a projector.

126. (Previously Presented) A method according to claim 28 wherein said semiconductor device is a head mount display.

127. (Previously Presented) A method according to claim 28 wherein said semiconductor device is a car navigation system.

128. (Previously Presented) A method according to claim 28 wherein said semiconductor device is a personal computer.

129. (Previously Presented) A method according to claim 28 wherein said semiconductor device is a portable information terminal.

130. (Previously Presented) A method according to claim 30 wherein said semiconductor device is a video camera.

131. (Previously Presented) A method according to claim 30 wherein said semiconductor device is a digital camera.

132. (Previously Presented) A method according to claim 30 wherein said semiconductor device is a projector.

133. (Previously Presented) A method according to claim 30 wherein said semiconductor device is a head mount display.

134. (Previously Presented) A method according to claim 30 wherein said semiconductor device is a car navigation system.

135. (Previously Presented) A method according to claim 30 wherein said semiconductor device is a personal computer.

136. (Previously Presented) A method according to claim 30 wherein said semiconductor device is a portable information terminal.

137. (Previously Presented) A method according to claim 31 wherein said semiconductor device is a video camera.

138. (Previously Presented) A method according to claim 31 wherein said semiconductor device is a digital camera.

139. (Previously Presented) A method according to claim 31 wherein said semiconductor device is a projector.

140. (Previously Presented) A method according to claim 31 wherein said semiconductor device is a head mount display.

141. (Previously Presented) A method according to claim 31 wherein said semiconductor device is a car navigation system.

142. (Previously Presented) A method according to claim 31 wherein said semiconductor device is a personal computer.

143. (Previously Presented) A method according to claim 31 wherein said semiconductor device is a portable information terminal.

144. (Previously Presented) A method according to claim 32 wherein said semiconductor device is a video camera.

145. (Previously Presented) A method according to claim 32 wherein said semiconductor device is a digital camera.

146. (Previously Presented) A method according to claim 32 wherein said semiconductor device is a projector.

147. (Previously Presented) A method according to claim 32 wherein said semiconductor device is a head mount display.

148. (Previously Presented) A method according to claim 32 wherein said semiconductor device is a car navigation system.

149. (Previously Presented) A method according to claim 32 wherein said semiconductor device is a personal computer.

150. (Previously Presented) A method according to claim 32 wherein said semiconductor device is a portable information terminal.

151. (Previously Presented) A method according to claim 33 wherein said semiconductor device is a video camera.

152. (Previously Presented) A method according to claim 33 wherein said semiconductor device is a digital camera.

153. (Previously Presented) A method according to claim 33 wherein said semiconductor device is a projector.

154. (Previously Presented) A method according to claim 33 wherein said semiconductor device is a head mount display.

155. (Previously Presented) A method according to claim 33 wherein said semiconductor device is a car navigation system.

156. (Previously Presented) A method according to claim 33 wherein said semiconductor device is a personal computer.

157. (Previously Presented) A method according to claim 33 wherein said semiconductor device is a portable information terminal.

158. (Previously Presented) A method according to claim 34 wherein said semiconductor device is a video camera.

159. (Previously Presented) A method according to claim 34 wherein said semiconductor device is a digital camera.

160. (Previously Presented) A method according to claim 34 wherein said semiconductor device is a projector.

161. (Previously Presented) A method according to claim 34 wherein said semiconductor device is a head mount display.

162. (Previously Presented) A method according to claim 34 wherein said semiconductor device is a car navigation system.

163. (Previously Presented) A method according to claim 34 wherein said semiconductor device is a personal computer.

164. (Previously Presented) A method according to claim 34 wherein said semiconductor device is a portable information terminal.

165. (Previously Presented) A method according to claim 35 wherein said semiconductor device is a video camera.

166. (Previously Presented) A method according to claim 35 wherein said semiconductor device is a digital camera.

167. (Previously Presented) A method according to claim 35 wherein said semiconductor device is a projector.

168. (Previously Presented) A method according to claim 35 wherein said semiconductor device is a head mount display.

169. (Previously Presented) A method according to claim 35 wherein said semiconductor device is a car navigation system.

170. (Previously Presented) A method according to claim 35 wherein said semiconductor device is a personal computer.

171. (Previously Presented) A method according to claim 35 wherein said semiconductor device is a portable information terminal.

172. (New) A method according to claim 15, wherein the method further comprising:

patterning the crystalline semiconductor thin film into at least one semiconductor layer after the second heat treatment; and

forming a gate insulating film on the semiconductor layer.

173. (New) A method according to claim 17, wherein the method further comprising:

patterning the crystalline semiconductor thin film into at least one semiconductor layer after the second heat treatment; and

forming a gate insulating film on the semiconductor layer.

174. (New) A method according to claim 20, wherein the method further comprising:

patterning the crystalline semiconductor thin film into at least one semiconductor layer after the second heat treatment; and
forming a gate insulating film on the semiconductor layer.

175. (New) A method according to claim 22, wherein the method further comprising:

patterning the crystalline semiconductor thin film into at least one semiconductor layer after the second heat treatment; and
forming a gate insulating film on the semiconductor layer.

176. (New) A method according to claim 28, wherein the method further comprising:

patterning the crystalline semiconductor thin film into at least one semiconductor layer after the second heat treatment; and
forming a gate insulating film on the semiconductor layer.
